DRAWING AMENDMENTS

Figs. 1 to 7B are amended by adding the legend "Prior Art." Formal drawings that incorporate this amendment are enclosed.

REMARKS

Claims 1-31 are pending in the present application. Claims 1-6, 10-14, 17-21 and 26-30 are rejected. Claims 7-9, 15-16, 22-25 and 31 have been indicated as being allowable if rewritten into independent form. The drawings are objected to. The reference cited in a previously submitted Information Disclosure Statement has not been considered.

Information Disclosure Statement

The Office Action indicates the Information Disclosure Statement a previously filed December 16, 2002 fails to comply with 37 CFR 1.98(a) because it did not include a legible copy of each cited document.

In a telephone conversation on or about September 13, 2005, the Examiner indicated the objection to the Information Disclosure was in error and that the reference was submitted properly; therefore, that reference will be considered before issuing the next Office Action.

Drawings

The drawings are objected to because Figs. 1-7B do not include a legend such as "Prior Art" but they illustrate only that which is old.

In response, Applicants submit herewith replacement sheets with Figs. 1-7B that include the legend "Prior Art."

Rejection of Claims

Claims 1-6, 10-14, 17-21 and 26-30 are rejected under 35 U.S.C. § 103(a) as being unpatentable over specified cited prior art. In particular, independent claim 1 is rejected as being unpatentable over U.S. patent 6,208,169 (referred to as "Wong") in view of U.S. patent application publication no. 2002/0103609 (referred to as "Kuyel"). The Office Action indicates Wong teaches all that is claimed except for obtaining sampling points close to corresponding zero-crossing points of a signal under measurement as approximated zero-crossing points, that Kuyel discloses this feature, and that it would have been obvious to use this teaching in Kuyel to modify Wong for the benefit of reducing testing costs.

Applicants respectfully traverse the rejection of claim 1 for each of two reasons: (1) there is no motivation to combine the teachings of these two references, and (2) even if combined, the two references do not disclose or suggest all that is claimed.

No Motivation to Combine

Wong discloses apparatuses and methods for detecting and measuring clock jitter that is internal to microprocessors. The basic method analyzes phase differences between a clock signal

and a reference clock signal, which are indicated in "phase difference bins" according to the magnitude and sign of the phase differences (col. 1 lns. 41-51; col. 2 lns. 30-35). The reference clock signal is a delayed version of the clock signal itself (col. 1 lns. 43-45; col. 2 lns. 46-51; col. 3 lns. 32-42; Fig. 2).

The Office Action indicates Kuyel teaches obtaining approximated zero-crossing points, which are sampling points close to corresponding zero-crossing points of the signal under measurement, and that it would have been obvious to modify Wong by this teaching in Kuyel.

The Office Action does not explain how this teaching in Kuyel could have been used to modify Wong. Applicants respectfully submit that there is no obvious way a person of ordinary skill would have known how to make the modification (1) to have any reasonable expectation of success, (2) without changing the basic principles upon which the teachings in Wong depend, and (3) without degrading the effects achieved by Wong to such an extent as to render Wong's teachings essentially useless.

The method disclosed in Wong depends on the results achieved by analyzing phase errors between two signals: (1) a clock signal and (2) a delayed version of that clock signal. Because the Office Action did not explain how the combination is supposed to have been made, Applicants assumed the approximated zero-crossing points are to be substituted for samples of either the clock signal or the reference clock signal (note that substituting for both signals would not read on the claim and would not provide a basis for rejection). If a substitution is made for either signal, the method disclosed in Wong would no longer work properly.

If it is still believed there would have been a motivation to combine the teachings in Wong and Kuyel, Applicants respectfully request that the next Office Action explain clearly how the teachings were to have been combined; that is, explain clearly how the teachings in Wong would have been modified by the teachings in Kuyel.

Not All Claim Features Are Taught by Cited Prior Art

Even if there would have been a motivation to combine the teachings in Wong and Kuyel, the result of the combination does not teach all features of the claimed invention.

Claim 1 recites an apparatus that comprises a phase error estimator and a period jitter estimator. (Features added by amendment herein are shown by underlined text.) The phase error estimator:

(a) obtains sampling points close to corresponding zero-crossing points of the signal under measurement as approximated zero-crossing points,

(b) obtains phase errors between the approximated zero-crossing points and the corresponding zero-crossing points of the signal under measurement, and

(c) outputs a zero crossing phase error data sequence and a zero-crossing time interval sequence between the approximated zero-crossing points.

The period jitter estimator:

(d) obtains a period jitter sequence of the signal under measurement from the zero-crossing phase error data sequence, the zero-crossing time interval sequence and a fundamental period of the signal under measurement.

The Office Action indicates Wong discloses all but feature (a) listed above but does not provide any details to support its assertion. Instead it refers generally to element 16 shown in Fig. 1A, which is a phase comparing element that compares a clock signal with a reference clock signal. Element 16 outputs phase differences to a set of bins according to the sign and magnitude of the phase differences (see col. 2 lns. 30-35). The "reference clock signal" is a delayed version of the clock signal itself (see col. 1 lns. 43-45; col. 2 lns. 46-51; col. 3 lns. 32-42; Fig. 2).

As explained above, Wong discloses obtaining phase errors between a clock signal and a delayed version of that clock signal. In contrast to that, the apparatus of claim 1 obtains phase errors between the approximated and corresponding zero-crossing points of the same signal. As a result, because Wong does not disclose or suggest feature (a), Applicants believe it is clear Wong also cannot disclose feature (b) because this claim feature relies on the presence of the approximated points to obtain the claimed phase errors.

The other prior art of record also fails to suggest feature (b). As explained above, a person cannot merely substitute the approximated zero-crossing points for either of the two signals in Wong because it would change the basic principles upon which the method in Wong depends and it would prevent that method from operating properly.

In view of the preceding reasons, Applicants respectfully submit that Wong neither discloses nor suggests claim feature (b). Because Wong does not teach features (a) and (b), it cannot teach features (c) or (d), which rely on the results obtained by features (a) and (b).

In addition, claim feature (c) is amended as shown above to include a zero-crossing time interval sequence between the approximated zero-crossing points and claim feature (d) is amended to include the zero-crossing time interval sequence and a fundamental period of the signal under measurement. These are not disclosed or suggested by the prior art.

Furthermore, contrary to what is asserted in the Office Action, Kuyel does not disclose or suggest feature (a). Kuyel discloses a system for measuring the jitter of analog-to-digital converters

(ADC). The basic method generates a signal, uses an ADC to obtain a first set of measurements representing overall jitter including system noise, generates a second set of measurements representing only system noise, and determines overall jitter alone by using variances in the first and second sets of measurements (paragraph [0010]).

The Office Action refers to text and figures in Kuyel to supports its contention that the obtaining of approximated zero-crossing points is disclosed. Specifically, it refers to paragraphs [0028] and [0041] and Fig. 5A. Paragraph [0041] appears to be irrelevant. Paragraph [0028] and Fig. 5A both describe the well known effects of jitter, which is that the sampling of a signal intended to occur at a zero-crossing point may instead occur at a point near the actual zero crossing. In other words, Kuyel merely illustrates the effects of jitter. These sampling points 502 and 503 shown in Fig. 5A, whether at or near the actual zero-crossing point, correspond to the convention sampling points referred to in claim 1 as the "corresponding zero-crossing points." There is no teaching in Kuyel that explains how to obtain additional approximated zero-crossing points for the same signal.

For these reasons, Applicants respectfully submit that the combination of references that are relied on by the Office Action do not teach any of the features for claim 1, discussed above.

Similar arguments apply to claim 17. All other claims are dependent on either claim 1 or claim 17 and add further limitations thereto.

CONCLUSION

Applicants amend the claims, amend the figures and request reconsideration in view of the discussion set forth above.

Respectfully submitted,

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Certificate of Mailing Under 37 CFR 1.8

I certify that this Response to Office Action and any enclosed materials are being deposited with the United States Postal Service on December 28, 2005 with sufficient postage as first class mail in an envelope addressed to MailStop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

David N. Lathrop

Enc. Drawing sheets for Figs. 1-7B
Check for $120